2013 UDOT RESEARCH PROBLEM STATEMENT

****** Problem statement deadline is March 25, 2013. Submit statements to Steve Bagley at sbagley@utah.gov ******

Problem Title: Algorithm Development for QA/QC of Asset Management Data and Forcasting of Sign Deterioration **No. :UT-13.06.04**

Submitted By: Kevin Heaslip **Organization:** Utah State University

Email: kevin.heaslip@usu.edu **Phone:** 435-797-8289

UDOT Champion (suggested): Stan Burns, UDOT Asset Management

Select a Subject Area

- ☐ Geotechnical
- ☐ Materials/Pavements
- ☐ Preconstruction
- ☐ Maintenance
- ☒ Planning/Asset Mgmt
- ☐ Traffic Mgmt/Safety
- ☐ Transportation Innovation

1. Describe the problem to be addressed.

Since the establishment of the first minimum retroreflectivity levels in 1993, agencies and researchers have focused on determining the service life of different sheeting type and color combinations. While deterioration curves and measured retroreflectivity are viable methods for maintaining retroreflectivity compliance, they do not ensure the ability of the traffic sign to convey its intended message. Retroreflectivity efficiency only ensures visibility but does not properly describe the legibility of the sign. Therefore, while agencies across the nation are developing and implementing traffic sign maintenance plans, the emphasis should not be solely placed on visibility.

In order to evaluate the performance of UDOT's traffic signs, a sample sign population was collected across all four of UDOT's maintenance regions. Analysis on this sample set not only determined the current rate of compliance, but it also identified several issues seen throughout the population. Signs under UDOT's jurisdiction are four times more likely to have substantial damage to the sign face than to fail to meet the minimum retroreflectivity levels. Analysis was conducted on determining contributing factors damage rates and it was determined that precipitation, elevation, seasonal temperature swing, and exposure of the sign all contributed to higher rates of damage. Additional analysis was conducted on determining the service life of different type and sheeting combinations. Hindered by the lack of known installation information, the analysis only identified service life as a significant contributor to sheeting deterioration.

The addition of mobile asset management data collection from Mandli will provide opportunities and challenges in the quality control of asset management and in the proper budgeting for sign management.

2. Describe why this research is important and how it is unique.

This research is important to utilize the data collected by UDOT in the most efficient manner possible. The significant effort to collect data shows a concerted effort to improve asset management in the state and the research proposed will be applied to create value added analysis of the data to support funding and decision making, ultimately saving the department money in the future.

3. List the research objective(s) to be accomplished:

1. Provide QA/QC for the data collected from Mandli
2. Create a living database of assets that can be updated and used for forecasting of deterioration
3. Development of algorithms for QA/QC and sign deterioration that can be attached to OMS

4. List the major tasks to accomplish the research objective(s):

1. Continue to work with the Industry Workgroup on asset management.
2. Conduct QA/QC on the Mandli Data using the database of collected signs from the previous USU research
3. Implement Policy which will Manage Data from Mandli and Create a Dynamic Database
4. Implement a predictive tool to forecast sign degradation over a 5 year timeframe
5. Implement a mobile application to collect data on new sign installations
6. Implement a budget planning tool, which will support changing levels of funding for sign management and will support several different maintenance goals.

5. List the deliverable(s) to come to UDOT from this research study:

1. Report on the QA/QC findings
2. Report on the sign management deterioration curves
3. Implementation of Policy that supports asset management decision-making over time.

6. Describe how the results of this study will be implemented at UDOT.

UDOT will use this research to implement practical informed policy in the area of asset management.

7. Estimated cost - Total: $150,000 **UDOT Share:** $75,000 **Other/Matching Funds:** $75,000

8. Outline the proposed schedule for this study, including estimated start date, duration, and major event dates.

The following schedule is proposed for this study. The study is scheduled for 18 months.

- Start Date: June 1, 2013
- QA/QC Report: December 1, 2013
- Algorithms for Sign Deterioration: May 31, 2014
- Predictive Tool for OMS: September 3, 2014
- Final Report: December 31, 2014